



ATTACHMENT A

Remarks

By this Amendment, various clarifying corrections have been made in the specification. In the claims, independent claim 1 has been amended for clarity and to better define the invention. Other dependent claims have also been amended consistent with the changes to independent claim 1 and/or for clarity; and a new dependent claim 51 has been added to more completely claim the present invention. It is submitted that the present application is in condition for allowance for the following reasons.

In the *Information Disclosure Statement* section of the DETAILED ACTION, the examiner noted that the listing of references in the specification was not equivalent to having such references listed in an IDS. Therefore, the two (see #3 of the *Specification* section) references mentioned and incorporated by reference in the specification are now provided in an IDS for the examiner's consideration – though it will be noted that the US published application has been substituted for the published PCT document.

In the *Specification* section, the abstract and disclosure were objected to for a number of noted problems. By this Amendment, the disclosure and abstract have been suitably amended to overcome the noted problems in a self-evident manner.

In the *Claim Suggestions* section, the examiner provided a number of suggested corrections to the claims. By this Amendment, the claims have been revised along the lines suggested by the examiner for the specific claims noted and additionally for all other claims for similar reasons in a self-evident manner.

In the *Claim Rejections - 35 USC § 112* section, claims 1-50 were all rejected for being indefinite for the noted reasons. By this Amendment, these claims have been amended to overcome the noted problems in a self-evident manner. It will be appreciated that many additional corrections of the same nature were also made in the claims. It is therefore submitted that the claims are now all definite and thus that the rejection of the claims under § 112 should now be withdrawn.

In the Claim Rejections - 35 USC § 102 section, independent claim 1 and dependent claims 2-4 were rejected under 35 USC § 102 as being anticipated by the EP Kim patent; while independent claim 1 and dependent claim 2 were rejected as being anticipated by the Coleman patent. However, for the following reasons, it is submitted that these claims are allowable over these references.

Amended claim 1 now clearly recites an engine including a turbocharging unit having the following specified features:

- (a) the turbine inlet pressure is maintained substantially equal to the compressor discharge pressure by an EGR bypass provided between an intake manifold and an exhaust manifold dimensioned to transfer a flow of exhaust gas to the intake manifold without significant loss of pressure;
- (b) the volume of air V_c is less than the volume drawn in by the engine at the speed N_{max} ; and
- (c) a flow of hot gases is drawn in again by the engine via the EGR bypass above a turbocharging adaptation speed N_a , where the volume drawn in is equal to volume V_c , and a flow of air is deflected towards the turbine below the adaptation speed N_a .

In the conventional engine comprising an EGR bypass, a problem to deal with is that the pressure in the intake manifold is sometimes higher than the pressure in the exhaust manifold, whereby it is difficult to transfer exhaust gas from the exhaust manifold to the intake manifold. This is explained in the Coleman patent (see column 1, lines 41 and 45). Thus, it is necessary to provide means for enabling exhaust gas recirculation.

The **EP Kim patent** discloses, with reference to Figure 1, an engine with a turbocharging unit 18 or 20 feeding an intake manifold 22 with fresh air and receiving exhaust gas from an exhaust manifold 26. A duct 38 connects the intake manifold 22 to the exhaust manifold 26 and comprises a valve 44. A turbine inlet of the turbocharging unit 18 or 20 is so dimensioned that the inlet turbine pressure is lower than the compressor outlet pressure for enabling a flow of fresh air from manifold 22 towards manifold 26 when valve 44 is opened (see paragraph 14, 1st sentence and paragraph 19, 1st sentence). An EGR duct 28 extends between manifold 26 and manifold 22, and comprises a valve 36, a cooler 34 and a venturi 46 for enabling an acceleration of a flow of gases in manifold 22 so as to lower the pressure and enable a drawing of exhaust gases through duct 28 into intake manifold 22 (see paragraph 19, 3rd sentence).

In view of the above, it is evident that the EP Kim patent does not describe nor suggest an engine comprising the combination of features (a) through (c) as noted above. Rather, the EP Kim patent teaches the skilled man to maintain a difference of pressure between the intake manifold and the exhaust manifold for fresh air circulation and to provide an auxiliary element (venturi 46) for enabling EGR flow.

The **Coleman patent** describes engines comprising means for forcing an EGR flow from an exhaust manifold 42a, 42b towards an intake manifold 22 when a pressure difference exists between these manifolds 22 and 42a, 42b; and more particularly when the pressure in the intake manifold 22 is higher than the pressure in the exhaust manifold 42a, 42b (see column 6, lines 51 to 61). With reference to Figure 1, it will be appreciated that this document also discloses an engine comprising a compressor 56 coupled to the turbine 46 of the turbocharging unit 24, 46 for forcing EGR flow (see column 4, lines 21 and 24). With further reference to Figure 2, this document further discloses a blower 56 for forcing EGR flow (see column 5, lines 56 and 59).

In view of the above, it is evident that this document does not disclose nor suggest an engine comprising the combination of features (a) to (c) mentioned above. Rather, the Coleman patent teaches the providing of a compressor or a blower for forcing EGR flow.

The engine according to the invention is very different from the engines disclosed in the two above-mentioned documents and proposes a novel structure enabling EGR flow. In particular, the engine according to Claim 1, when operating below a rotation speed of the engine called the adaptation speed N_a which depends upon the turbocharging unit and the engine, has the volume V_c of fresh air discharged at the compressor outlet higher than the volume V_m of gases drawn in by the engine; and above the rotation speed N_a , V_c is inferior to V_m .

Further, in the engine according to the invention, the pressure in the intake manifold equals the pressure in the exhaust manifold when the EGR bypass is fully opened, and the transfer of gases between the intake manifold and the exhaust

manifold depends upon the difference between V_c and V_m and no longer between a difference of pressure between them as in conventional engines.

As a matter of fact, in the engine according to the invention, below the rotation speed N_a , V_c is superior to V_m , and fresh air coming from the compressor of the turbocharging unit is deflected directly into the exhaust manifold to evacuate fresh air in excess at the inlet of the engine. And above the speed rotation N_a , V_c is superior to V_m , and the exhaust gases are draw into the engine for compensating for the difference between V_c and V_m .

Thus, with this very simple structure as claimed, when the EGR bypass is fully opened, the speed of rotation of the turbocharging unit surprisingly adapts itself to the speed of rotation of the engine. As a matter of fact, for a given temperature of the exhaust gases and corresponding speed of rotation of the engine, it was not obvious that the volume of the exhaust gases at the outlet of the engine equals the volume of exhaust gases necessary to drive the turbine of the turbocharging unit added to the difference between V_m and V_c , i.e. the volume of gas transferred between the manifolds. In fact, the speed of rotation of the turbocharging unit surprisingly automatically adapts itself such that these volumes are equal.

Therefore, for all of the foregoing reasons, it is submitted that amended independent claim 1 is neither disclosed nor made obvious by either the EP Kim patent or the Coleman patent so that claim 1 is now allowable. For these same reasons, it is submitted that dependent claims 2-4, as well as the remaining dependent claims 5-51, are now allowable.

In the *Allowable Subject Matter* section, dependent claims 5-50 were indicated as containing allowable subject matter even though rejected under § 112. This indication of allowable subject matter is appreciated. It is submitted that these claims, as well as new claim 51 which depends from claim 14 and which is similar to claim 15, are now allowable since independent claim 1 from which they all depend is now allowable as noted above.

The remaining references which were cited but not applied have been reviewed but are not believed to be pertinent to the patentability of the present invention.

For all of the foregoing reasons, it is submitted that the present application is in condition for allowance and such action is solicited.